ME 324 MACHINE DESIGN I

Instructor: Fazıl Önder Sönmez
Office: M 4215
Phone: Office: (212) 359-7196; Mobile: (542) 780 6279
e-mail: sonmezfa@boun.edu.tr
Class hours: Mondays 11-13 (M 2171), Wednesdays 11-13 (NH 102)
Office hours: Mondays 13–15 and Wednesdays 15–17, or drop by
Assistant: Necdet Ali Özdür, e-mail: necdet.ozdur@boun.edu.tr, office: KB 243, tel: 4478
Prerequisite: Mechanics of Materials, ME 345
Prerequisites by topic: Statics and free body diagrams, strain-deflection relations, stress-strain relations, stress analysis, combined loadings and Mohr circle, deflection analysis.

Course learning objectives: **1)** Applies principles of mechanics to perform kinematic, force, stress, and failure analyses of structural parts and machine components like shafts. **2)** Applies knowledge of fluid mechanics in the analysis of lubrication and design of sliding bearings. **3)** Solves open-ended design problems considering the factors like loading, material, manufacturing, and constraints like safety, cost, and performance. **4)** Selects a suitable material for a machine part considering loading conditions, critical failure mode, and cost. **5)** Develop ability to work in teams. **6)** Develop computer programming to obtain optimum values for design variables satisfying performance criteria and side constraints.

The course contributes to the following student outcomes*: Outcome a:* Students have an ability to apply knowledge of mathematics, science, and engineering. *Outcome e*: Students have an ability to identify, formulate, and solve engineering problems. *Outcome c*: Students have an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. *Outcome d:* Students have an ability to function on multi-disciplinary teams. *Outcome k:* Students have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Textbook: Machine Component Design, Juvinall R.C., Marshek K., John Wiley & Sons, 2012.

Grading:

Quizzes	15 %	(Quiz problems will be similar to the quiz assignment problems)
Design Project	12 %	
Midterms	38 %	
Final Exam	35 %	
Attendance	±2 %	

Notes: Exams and quizzes are closed book.

Tentative Course Schedule:

Hours	Topics
1-2	Introduction to design
3-6	Load analysis (static, dynamic: Vibration and impact)
7-9	Material selection in design
	Stress, strain, and deflection (Reading assignment)
	Quiz 1
10-14	Static failure theories
15	Fracture mechanics for static loads
16-18	Safety factors and reliability
19	Dimensions and tolerances
	Quiz 2
	Midterm 1
20-28	Fatigue failure theories
29	Linear elastic fracture mechanics
	Quiz 3
	Midterm 2
	Surface damage (Reading assignment)
30-37	Shafts and associated parts
	Design Project
38-46	Lubrication and sliding bearings
46-48	Rolling element bearings
	Final